

AN ANALYSIS OF THE EFFECTS OF INTERSCHOLASTIC ATHLETIC
COMPETITION ON SCHOLASTIC ACHIEVEMENT

by

MARTIN MARC LEFTOFF

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CHAPTER I

INTRODUCTION

The effects of high school interscholastic competition on the grades achieved by participating pupils is a matter of conjecture. Those who oppose interscholastic athletic competition support the belief that such competition is a time consuming activity which results in poor classroom achievement due to insufficient time for study. Others, who favor such competition, claim that it provides young people with the needed motivation to work harder in class, thus, stimulating interest in class activities and improving grades. In spite of the din caused by these and a host of other opinions regarding interscholastic competition, such competition continues in America's high schools and its effects should be more than mere speculation.

Statement of the Problem

Using teacher awarded grades as the criterion of classroom achievement, it was the purpose of the study to determine the effects of interscholastic athletic competition (1) on the classroom achievement of eleventh grade students attending schools which are members of the Central Kansas League; and (2) on students whose grades are not commensurate with their predicted ability as judged by the Differential

Aptitude Tests. Specifically, the primary consideration was to test the following hypotheses:

- H₁: There is no significant difference in subject grades, awarded by teachers, when the students participate in interscholastic athletic competition and when they do not participate.
- H₂: There is no significant difference in subject grades, awarded by teachers, to students whose classroom performance is not equal to that predicted by the Differential Aptitude Tests, when these students participate in interscholastic athletic competition and when they do not participate.

Importance of the Study

Because interscholastic athletic competition is a part of the learning experience provided to the students under the supervision of the school, such competition is a part of the educational program. It is the responsibility of educators to appraise all aspects of the educational program and determine the effects of learning experiences on the students.

In its official publication the Kansas High School Activities Journal, the Kansas High School Activities Association presented data about high school activities sponsored in the schools, the number of schools participating, and the approximate number of pupils taking part during the

1968-69 academic year.¹ The portion of that data which relates to interscholastic athletic competition is presented in Table I. This table makes it clear that a large proportion of the high schools do sponsor interscholastic athletic competition and that a correspondingly large number of students participate in these activities. For the benefit of the students, the school must be aware of the effects of interscholastic athletic competition on the achievement of students whose progress is at least in part the responsibility of the school.

There has been much speculation about students who do not achieve in school at the rate predicted by standardized tests. Such students are termed "Underachievers". Accepting the concept of underachievement as a reality, provides another reason why the effects of interscholastic athletic competition upon the achievement of those who participate must be studied. Teachers have expressed the opinion that the underachiever who participates in interscholastic athletics tries harder in his class work during the time he participates in sports. The academic effort put forth by such a student results in better grades and hopefully in a more optimistic attitude toward his future.

¹Kansas High School Activities Association, "KSHSAA Senior High School 1968-69 Activity Survey," The Kansas High School Activities Journal Vol. 31, No. 6 (Topeka: Kansas High School Activities Association, 2/69), p. 1.

TABLE I
KSHSAA SENIOR HIGH SCHOOL 1968-69
ACTIVITY SURVEY*

Activity	Schools	Students
Basketball	440	13,750
Track and Field	435	22,000
Football		
11-Man 345		
8-Man 75	420	19,000
Cross Country	188	3,000
Golf		
Sand 95		
Grass 72	167	3,100
Wrestling	111	2,200
Tennis	92	920
Baseball	66	1,200
Gymnastics	31	530
Swimming	23	430

*443 senior high schools and approximately 150,000 students were involved in the compilation of this material.

If the opinion of the teachers is a fact and underachievers do get more out of the school program as a result of interscholastic athletic competition, then this kind of program is of value to the pupil.

Interscholastic athletic competition is a part of the educational program in most American high schools. However, there is little evidence as to the effects of such competition on the achievement of participating students. Therefore, the importance of this study is that through statistical analysis it seeks additional evidence concerning the effects of interscholastic athletic competition on the classroom achievement of students.

Limitations of the Study

The study of the effects of interscholastic athletic competition on the classroom achievement of students was limited to students who were juniors during the 1967-68 academic year. All students in this study were drawn from the six Kansas high schools which comprise the Central Kansas League. The subjects used in determining classroom achievement were English, mathematics, science, foreign language, and social studies.

Because this study was concerned with the under-achieving student, the frustrating problem of identifying these students was encountered. For the purpose of

identifying underachieving students, sophomore grades, for the previously mentioned subjects, were used in conjunction with the Differential Aptitude Tests. Only this measure of aptitude was used since it was the one test used by each of the six schools.

Although the scope of interscholastic athletics sponsored by Kansas high schools is broad, the interscholastic athletics used in this study were limited to: football, cross-country, basketball, wrestling, and track.

The sample used in this study consisted of 169 students. Three factors limited the sample: (1) all students had taken the Differential Aptitude Tests and the results were accessible, (2) all students had completed at least one season in varsity competition, and (3) the names of students were provided by school officials.

Definition of Terms

1. The Participant in interscholastic athletic competition. Any high school junior who had practiced and had played on one or more varsity squads for at least one season.

2. The underachieving student. A student whose high school grade point average, for the previously mentioned subjects, was less than that which could be inferred from his predicted percentile rank score on the verbal

reasoning and numerical ability sections of the Differential Aptitude Tests.

CHAPTER II

REVIEW OF THE LITERATURE

The effects of interscholastic athletic competition on the grades of high school participants have been a matter of concern to educators for some time. As a result, studies have been made and the conclusions drawn were pertinent to this study.

Russell M. Eidsmoe, Head of the Department of Education at Morningside College in Sioux City, Iowa, sought to determine the effects of interscholastic athletic competition on the grades of high school participants comparing their grades to those achieved by their classmates.¹ Eidsmoe concluded his survey of the football players with the following comment about athletes and the effects of interscholastic athletic competition. The comment had particular interest since it expressed the thought that the physically well endowed were likely to be mentally well endowed as well.

It is difficult to erase the thought that good athletic teams are made up of boys with superior physiques combined with higher mental performance than possessed by their classmates.

¹Russell M. Eidsmoe, "High School Athletes are Brighter," School Activities, 35 (November, 1963), 75-77.

The survey does show very clearly that athletes who are highly competitive in their chosen sport are also significantly above the average of their fellow students in academic performance.²

Walter E. Schafer and J. Michael Amer conducted a research study, during the summer of 1964, using tenth grade students chosen from two Midwestern senior high schools. Of the 585 boys chosen as subjects, 164 were classified as athletes. Schafer and Amer were concerned with: (1) the effects of interscholastic athletic competition on the athletic performance of athletes; (2) the scholastic effects of varying amounts of athletic participation; (3) the scholastic effects of sports activities offering varying amounts of recognition and attention.³ Recognizing that there may have been many differences between the athlete and the nonathlete, Schafer and Amer matched each athlete with a nonathlete in terms of intelligence test scores, occupations of fathers, curriculums, and grade point averages for the final semester of the junior high school.

As in the case of the Eidsmoe study, Schafer and Amer learned that when grade point averages for athletes and nonathletes were compared, the athletes did better.

²Ibid., p. 70.

³Walter E. Schafer, and J. Michael Amer, "Athletes Are Not Inferior Students," Trans-action, Vol. 6 (November, 1968), pp. 21-26.

In order to determine if the amount of athletic participation affected the academic achievement of athletes, Schafer and Amer divided the athletes into two groups, those who had completed one or two seasons of athletic participation, and those who had completed three or four seasons of athletic participation. All athletes were again matched with nonathletes. As a result of this comparison, Schafer and Amer concluded that the athlete does better than the nonathlete regardless of the amount of his participation.

In their attempt to determine the scholastic effects of participation in interscholastic activities offering varying degrees of recognition and attention, the athletes were divided into two groups, those participating in major sports and those participating in minor sports. It was concluded that the participants in major sports had lower grade point averages than participants in minor sports. However, both major and minor sport participants achieved higher grades than their classmates.

It seems that there is a strong relationship between scholastic achievement and educational expectation. The successful student is likely to have a positive self-image. Such an image would contribute to his educational expectations. A study by Richard Rehberg and Walter E. Schafer supports the idea that the relation between scholastic

achievement and educational expectation is a real one.⁴

Rehberg and Schafer summarize the results of their study as follows:

A greater proportion of athletes than nonathletes expect to enroll in a four year college, even when the potentially confounding variables of status, academic performance, and parental encouragement are controlled. This relationship is especially marked among boys not otherwise disposed toward college, that is, those from working-class homes, those from the lower half of their graduating class, and those with low parental encouragement to go to college.⁵

Of particular interest to a society in which there is great striving for improved status was the implication that Rehberg and Schafer drew from their study.

Interscholastic Athletics will have been shown to be one channel for upward mobility, insofar as mobility is contingent on a college education.⁶

Thus far, all of the research studies cited have presented evidence that interscholastic athletic competition exerts a positive effect upon the achievement of students. However, it is left to James Coleman in his study, "The Structure of Competition,"⁷ to explain why athletic competition is likely to have positive effects on the classroom

⁴Richard A. Rehberg and Walter E. Schafer, "Participation in Interscholastic Athletics and College Expectations," American Journal of Sociology, Vol. 73, No. 6 (November, 1968), pp. 732-40.

⁵Ibid., p. 740.

⁶Ibid., p. 740.

⁷James C. Coleman, "The Structure of Competition," Harvard Educational Review, XXIX, No. 4 (Fall, 1959), p. 350.

achievement of students. Coleman says that a student will work harder when he is not only working for himself but for a school and team as well. In Coleman's words,

Motivations may be sharply altered by altering the structure rewards, and more particularly that among adolescents, it is crucial to use the informal group rewards to reinforce the aims of education rather than to impede them.⁸

Pertinent Opinion

Harold Taylor stated his opinion as to the relationship which exists between athletic competition and scholastic achievement in an article entitled, "Recreation as a Mode of Learning".⁹ Taylor suggested that the student who participates in interscholastic athletic competition does so because he enjoys it and he enjoys it because he is a part of it. In the same way, the article continued, if the student is to succeed in school, he must enjoy learning activities and he can enjoy them only if he is involved in the learning process.

The concept of "Underachievement" was an integral part of this study because a part of the study was devoted to the effects of interscholastic athletic competition

⁸Ibid., p. 350.

⁹Harold Taylor, "Recreation as a Mode of Learning," Journal of Health and Physical Education, XXXIX, No. 6 (June, 1968), 19-20, 66-67.

on the scholastic achievement of underachieving students. Because some educators question the concept of underachievement, it seemed expedient to present an educator's opinion of underachievement. Robert M. Jackson said that the concept of underachievement is an acceptable one provided the individual does not consider the term to be based on an actual limitation of ability. He points out that there is no direct means by which intellectual capacity can be directly measured and that a student's predicted mental ability is based on tests which, when checked for validity and standardized, give us a clue about the individual's mental capacity. Therefore, it is Jackson's opinion that the underachiever is an individual whose performance is below that level of learning ability predicted by a test.¹⁰

One final opinion seemed relevant to this study. Harold Zeitz, chairman of the department of physical education at Simon Gratz High School, in Philadelphia, Pennsylvania, described the effect interscholastic athletic competition had on John W., a potential high school drop-out. Zeitz expressed his belief that as a result of interscholastic athletic competition John improved his grades and remained in school.

¹⁰Robert M. Jackson, "In Support of the Concept of Underachievement," Personnel and Guidance Journal, XXXI, No. 10 (September, 1968), 56.

Summary

The research studies cited in this review of the literature established a positive relationship between scholastic achievement and interscholastic athletic competition. In each case, the results of study were the same; the grade point averages of competing high school athletes were higher than those of their classmates. Even in the study conducted by Schafer and Amer, where such variables as family status were carefully controlled, the athletes achieved higher total grade point averages and higher subject area grade point averages than their classmates.

The question that emerged as a result of these studies is why do athletes do better than their classmates? It was Eidsmoe's opinion that athletes do better because they are smarter. However, he did not attempt to substantiate his opinion through the use of a statistical analysis and as a result, Eidsmoe's idea could only be considered as conjecture until the facts have been established through research. James C. Coleman conducted a study in order to determine why athletes achieve higher grades and he concluded that the peer recognition received by the athletes results in their superior academic performance.

The pertinent opinion relating to the effects of athletic competition on scholastic achievement provided emphasis to the results of research studies. One such

opinion supported the positive effects of athletics with the instance of a potential drop-out who as a result of athletic participation remained in school. Although Harold Zeitz, the author of this article, did not refer to the student in question as an underachiever, he did point out that the student's grades were greatly improved. It seemed reasonable to assume that this student was an underachiever since he was not achieving in school at the level he managed to achieve after he began competing in high school athletics. The concept of underachievement, which is related to this study, was supported by the opinion of Robert Jackson who suggested that the underachiever is the individual whose performance is below the level of learning ability predicted by a test.

CHAPTER III

DESIGN AND PROCEDURE

The object of the investigation was to determine the effects of interscholastic athletic competition on the scholastic achievement of competing high school boys. It was the further intent of this study to determine the effects of such competition on students identified as under-achievers. In order to accomplish this investigation, the names of students and the athletic activities in which they competed, their subject grades for both semesters of tenth and eleventh grade, and their scores on a standardized aptitude test were needed. All of this information was gathered from the school files with the cooperation of the school staff. With this information at hand, it was possible to group the students according to the sport or sports in which they participated, to identify the underachievers, and to do a statistical analysis using the t-test for related samples.

Population

The population from which the samples were drawn consisted of the student bodies from the six high schools which comprise the Central Kansas League. Table II provides a description of each of the six high schools in terms of

the sample population, the high school population, the total pupil population of the school district, and the number of persons residing in the school community.

TABLE II
A DESCRIPTION OF CENTRAL KANSAS LEAGUE SCHOOLS*

Name of High School	Sample Population	High School Population	District Population	Community Population
Junction City	30	911	5,869	17,181
McPherson	21	650	2,844	10,356
Clay Center	25	644	2,051	4,917
Salina	40	1,777	10,078	39,167
Manhattan	27	1,112	5,592	23,480
Emporia	26	909	4,080	18,288
Totals	169	6,003	30,514	113,389

*W. C. Kampschroeder, Kansas Educational Directory 1967-68 (Topeka: The State Department of Public Instruction, 1968).

Sample

The criterion used in selecting the student sampling was that they be eleventh grade students who had participated in one or more of five specified sports activities for at least one season. The sports activities included: football, cross-country, basketball, wrestling and track. Although these five sports do not represent all of the athletic

activities sponsored by Central Kansas League schools, only these five sports were offered by each of the six schools which comprise the league. Eligibility requirements varied to some degree among the schools, yet no effort was made to control this variance. In limiting the student sample to eleventh graders, it was believed that all subjects had demonstrated their athletic ability either in previous athletic competition or in physical education classes. Moreover, it would seem that eleventh grade students involved in interscholastic athletic competition were achieving some satisfaction as a result of their efforts or they would not continue in this endeavor. No attempt was made to determine what satisfactions the students derived through athletic participation.

Procedures

This study was conducted early in the spring of the 1968-69 academic year, a time when the spring semester was still in session. As a result, the student sample was limited to students who were eleventh graders during the previous school year, 1967-68.

Once having received the approval of the secretary of the Central Kansas League to conduct this study among league schools and the approval of individual school administrators and staffs, visits were paid to each of the six

schools. The names of students who had met the criteria established for the student sample were gathered from school files.

Once having collected the names of students and their respective activities, the students were grouped according to the seasons in which they participated. The seasons for school sponsored athletic activities were identified as: fall, winter, and spring. It was reasoned that if athletic competition affects the semester grades of students, it would affect those students who participated during the fall season during the fall semester, those who participated during the winter season, during the fall and spring semesters, and those who participate during the spring season during the spring semester. Because it was believed that each of the six schools should be represented in each of the athletic activities, fall sports were limited to football and cross-country, winter sports were limited to basketball and wrestling, and spring sports were limited to track. No Central Kansas League school prevented an eligible student from participating during as many seasons as he wished, therefore the following seven sports activity groups were identified: those who participated in a fall sport only, those who participated in a winter sport only, those who participated in a spring sport only, those who participated in a fall and winter sport, those who

participated in a fall and spring sport, those who participated in a winter and spring sport, and those who participated in a fall, winter and spring sport.

A school guidance counselor went through the guidance office records and provided subject grades for both semesters of the student's tenth and eleventh school year. On the basis of this information, grade point averages were compiled for fall and spring semesters. Only five subjects, English, mathematics, science, foreign language, and social studies were used in determining the grade point averages which served as the independent variable. It was reasoned that variations in the difficulty of subject matter and methods of teaching would be evenly distributed among the six schools.

Tenth year grade point averages in conjunction with scores from the Differential Aptitude Tests were used in identifying underachievers. A number of the other aptitude tests were administered by the schools belonging to the Central Kansas League, however, only the Differential Aptitude Tests were administered by each of the six schools, and these were administered to the students as ninth graders. It was believed that a single test of aptitude administered by each of the schools would provide more accurate information than the use of several tests administered to some of the sample and not others.

The identification of the underachiever began with the compilation of teacher awarded grades, for the five subjects for fall and spring semesters of the tenth year. Grades in Central Kansas League schools are assigned on an A through F basis. These letter grades were converted to numerical grades using the following system: A = 4.0, B = 3.0, C = 2.0, D = 1.0, and F = 0.0. It was noted that grade point averages for the tenth grade ranged from 4.0 to 0.7, and for the eleventh grade, from 4.0 to 0.5.

Measuring Instrument

Another aspect of the procedure used in the identification of the underachiever involved the Differential Aptitude Tests. This measure of aptitude consists of eight sections: verbal reasoning, numerical ability, abstract reasoning, space relations, mechanical reasoning, clerical speed and accuracy, language usage I, spelling and language usage II, sentences. The results of this measure of aptitude are reported to the schools in two ways, on the basis of raw score, and on the basis of percentile rank. The Differential Aptitude Test depends upon predictions of course grades for high school subjects, achievement test results, and vocational and educational success for its validity. According to the manual, these studies have been made on a

national basis since 1947.¹

In identifying the underachiever, only the verbal reasoning and numerical ability, reported as percentile ranks were used. According to the manual, these two sections have the highest coefficient of correlation between the Differential Aptitude Test scores and course grades in high school.² In regard to the uses of percentile rank results, it seemed that these are more easily understood than raw scores since they indicated how the student did in relation to other students who have taken the test.

Through the use of a stanine conversion table, applicable to the student sample used in this study, which converted the verbal reasoning and numerical ability percentile ranks, recorded from the Differential Aptitude Tests results, and which suggested adjective classifications for each of the stanine values, a scattergraph was constructed. A summary of the scattergraph is presented in Tables III through X. It was reasoned that the student classified as superior ought to achieve a superior grade. For the purpose of identifying the underachiever, a superior grade was arbitrarily limited to 4.0. In the same way, an above

¹George K. Bennett, Harold G. Seashore, and Alexander G. Wesman, Manual for the Differential Aptitude Tests, third edition (New York: The Psychological Corporation, 1959), p. 35.

²Ibid., pp. 40-48.

average student was limited to a grade point average ranging from 3.0 - 3.9, an average student was limited to a grade point average ranging from 2.0 - 2.9, a below average student was limited to a grade point average ranging from 1.0 - 1.9, and a poor student was expected to achieve a grade point average of 0.0 - 0.9.

Table III describes the scholastic achievement of the total student sample consisting of 169 students. In the left hand column are the five ability classifications from superior to poor. At the top of the chart are grade point averages ranging from 4.0 to 0.0. In the group classified as superior, two students were achieving at the level predicted, sixteen were underachieving by one grade point, five by two grade points, and one student was underachieving by three grade points. In the above average group, two students were doing better than had been predicted, sixteen were achieving at the level predicted, twenty-five were underachieving by one grade point, and seven students were underachieving by two grade points. In the large group classified as average, no student achieved a 4.0 grade point average, but six students did do better than predicted, twenty-nine students did achieve at the level predicted, forty-four students underachieved by one grade point, and only one student achieved less than a 1.0 grade point average. In the below average group, one student did

better than predicted, eleven achieved at the predicted level, and three underachieved by one grade point. It is interesting to note that none of the students in this sample could be classified as poor students and only four students had less than a 1.0 grade point average for the tenth grade.

TABLE III
IDENTIFICATION OF UNDERACHIEVERS IN THE
TOTAL STUDENT SAMPLE

Ability Groups	Total Student Sample = 169					Number of Underachievers
	4.0	3.0	2.0	1.0	0.0	
Superior 96%	2*	16	5	1		22
Above Average 77-95%	2	16*	25	7		32
Average 23-76%		6	29*	44	1	45
Below Average .04-22%			1	11*	3	3
Poor .00-.03%						
Total						102

*Indicated the number of students performing on the level predicted by the Differential Aptitude Tests.

In determining the effects of interscholastic athletic competition on the scholastic achievement of competing students, as previously explained, the student sample was divided into subgroups. For each subgroup, a scattergraph was employed to identify the underachiever. In using this separate analysis technique for each classification, the effects of interscholastic athletic competition on scholastic achievement could be determined not only for the classification as a whole, but for the underachievers which are a part of every group.

Table IV identifies underachievers in that part of the sample participating only in a fall sport. Forty-seven students participated in a fall sport only. Of the five students classified as superior, none achieved a superior grade point average, two underachieved by one grade point, two underachieved by two grade points, and one student underachieved by one grade point. Fourteen students were identified as above average, four students did achieve at the predicted level, eight underachieved by one grade point, and two students underachieved by two grade points. Twenty-one students were classified as being of average ability. One student achieved at an above average level, six achieved at an average level, and fourteen students underachieved by one grade point. In the fall sport only group, no student was classified as having poor ability and only one student

achieved less than 1.0 grade point average for the tenth grade. Of the forty-seven students in this group thirty students or 64% were underachieving.

TABLE IV
IDENTIFICATION OF UNDERACHIEVERS PARTICIPATING
IN A FALL SPORT ONLY

Ability Groups	Fall Only Group = 47					Number of Underachievers
	4.0	3.0	2.0	1.0	0.0	
Superior 96%		2	2	1		5
Above Average 77-95%		4*	8	2		10
Average 23-76%		1	6*	14		14
Below Average .04-22%			1	5*	1	1
Poor .00-.03%						
Total						30

*Indicates the number of students performing on the level predicted by the Differential Aptitude Tests.

Table V refers to the thirty-seven students who participated in a winter sport only. In this group, five students were classified as superior. None achieved at the predicted level, four underachieved by one grade point and one student underachieved by two grade points. Eight

students were classified as above average, three did achieve at the predicted level, three underachieved by one grade point and two students underachieved by two grade points. Of the nineteen students classified as average, two students achieved above their predicted level, six achieved at the predicted level, and eleven underachieved by one grade point. Only five students were classified as being below average. Three of these achieved at their predicted level and two underachieved by one grade point. Again, no student was classified as having poor ability and only two achieved below a 1.0 average. Twenty-three students or sixty-three per cent of this group were classified as underachievers.

Table VI refers to the twelve students who participated in a spring sport only. Three students were classified as above average. One of this group achieved at his predicted level and two underachieved by one grade point. Seven students were classified as average. Two of these students achieved at their predicted level, four underachieved by one grade point and one underachieved by two grade points. Only two students were classified as below average and both of these achieved at their predicted level. Seven of the twelve students or sixty-nine per cent of the spring sport only group were considered as underachievers.

TABLE V
IDENTIFICATION OF UNDERACHIEVERS PARTICIPATING
IN A WINTER SPORT ONLY

Ability Groups	Winter Sport Only = 37					Number of Underachievers
	4.0	3.0	2.0	1.0	0.0	
Superior 96%		4	1			5
Above Average 77-95%		3*	3	2		5
Average 23-76%		2	6*	11		11
Below Average .04-22%				3*	2	2
Poor .00-.03%						
Total						23

*Indicates the number of students performing on the level predicted by the Differential Aptitude Tests.

TABLE VI
IDENTIFICATION OF UNDERACHIEVERS PARTICIPATING
IN A SPRING SPORT ONLY

Ability Groups	Spring Sport Only = 12					Number of Underachievers
	4.0	3.0	2.0	1.0	0.0	
Superior 96%						
Above Average 77-95%		1*	2			2
Average 23-76%			2*	4	1	5
Below Average .04-22%				2*		0
Poor .00-.03%						
Total						7

*Indicated the number of students performing on the level predicted by the Differential Aptitude Tests.

Table VII describes the twenty-two students who participated in both a fall and a winter sport. In this group, thirteen students or fifty-nine per cent were classified as underachievers. Five students were classified as having superior ability. Of these, one achieved at his predicted level, three underachieved by one grade point and one underachieved by two grade points. Three students were

classified as being of above average ability. None of these students achieved at their predicted level, two under-achieved by one grade point and one by two grade points. The average ability students were the largest number of students participating in fall and winter sports. Of these thirteen students, seven achieved at their predicted level and six underachieved by one grade point. In this group only one student was classified as having less than average ability and he achieved as predicted.

TABLE VII
IDENTIFICATION OF UNDERACHIEVERS PARTICIPATING IN
FALL AND WINTER SPORTS

Ability Groups	Fall and Winter Sports = 22					Number of Underachievers
	4.0	3.0	2.0	1.0	0.0	
Superior 96%	1*	3	1			4
Above Average 77-95%			2	1		3
Average 23-76%			7*	6		6
Below Average .04-22%				1*		0
Poor .00-.03%						
Total						13

*Indicates the number of students performing on the level predicted by the Differential Aptitude Tests.

Table VIII presents a description of the twenty students who participated in fall and spring sports. Ten of these students or 50 per cent were classified as under-achievers. Of special interest was the fact that this group of students was one of three groups that did not have any students classified as having less than average ability. Five students, in this group, were classified as having superior ability; one achieved his predicted level, three underachieved by one grade point, and one underachieved by two grade points. Six students were classified as having above average ability; three achieved at their predicted level and three underachieved by one grade point. Nine students were classified as having average ability; two did better than was predicted, four achieved at their predicted level, and three underachieved by one grade point.

Table IX is a description of the four students who had participated in winter and spring sports. Of the four students who participated, three students or 75 per cent, the largest per cent of any group, were classified as under-achievers. Of this group, one student was classified as having above average ability and he underachieved by one grade point; three students were classified as having average ability, one such student achieved at his predicted level and two underachieved by one grade point.

TABLE VIII

IDENTIFICATION OF UNDERACHIEVERS PARTICIPATING IN
FALL AND SPRING SPORTS

Ability Groups	Fall and Spring Sports = 20					Number of Underachievers
	4.0	3.0	2.0	1.0	0.0	
Superior 96%	1*	3	1			4
Above Average 77-95%		3*	3			3
Average 23-76%		2	4*	3		3
Below Average .04-22%						
Poor .00-.03%						
Total						10

*Indicates the number of students performing on the level predicted by the Differential Aptitude Tests.

TABLE IX

IDENTIFICATION OF UNDERACHIEVERS PARTICIPATING IN
WINTER AND SPRING SPORTS

Ability Groups	Winter and Spring Sports = 4					Number of Underachievers
	4.0	3.0	2.0	1.0	0.0	
Superior 96%						
Above Average 77-95%			1			1
Average 23-76%			1*	2		2
Below Average .04-22%						
Poor .00-.03%						
Total						3

*Indicates the number of students performing on the level predicted by the Differential Aptitude Tests.

Table X describes the performance of the twenty-seven students who participated in fall, winter, and spring sports. Sixteen of the twenty-seven students or 59 per cent were classified as underachievers, after analysis. This was unique in the fact that the largest proportion of them were classified as having above average ability. No student had below average or poor ability. Four students in the classification were considered to have superior ability and each of these underachieved by one grade point. Fifteen students

were considered to have above average ability. Of these, two achieved better than predicted. Five achieved at their predicted level, six underachieved by one grade point, and two students underachieved by two grade points. Eight students were considered to have average ability. One such student achieved a grade point average which was better than predicted, three students achieved at their predicted level, and four students underachieved by one grade point.

TABLE X
IDENTIFICATION OF UNDERACHIEVERS PARTICIPATING IN
FALL, WINTER, AND SPRING SPORTS

Ability Groups	Fall, Winter, & Spring = 27					Number of Underachievers
	4.0	3.0	2.0	1.0	0.0	
Superior 96%		4				4
Above Average 77-95%	2	5*	6	2		8
Average 23-76%		1	3*	4		4
Below Average .04-22%						
Poor .00-.03%						
Total						16

*Indicates the number of students performing on the level predicted by the Differential Aptitude Tests.

Summary of Analysis

Thirty-four students or approximately fourteen per cent of the student population were classified as having superior ability, while only two per cent of the student sample had superior grade point averages; fifty students or approximately thirty per cent of the student population were classified as having above average ability, but, only twenty-two per cent achieved above average grades while in the tenth grade; eighty students or approximately forty-seven per cent of the student sample were considered to have average ability, while thirty-six per cent of the student sample achieved average grades; fifteen students or approximately eight per cent of the student sample were considered to be of below average ability, yet, thirty-seven per cent of the student population achieved below average grades; finally, no student was considered to have poor ability, yet, two per cent did have poor grade point averages.

Analysis of Data

A statistical analysis was conducted to determine if there were any significant difference between the eleventh year fall semester grade point average and the eleventh year spring semester grade point average. Two separate analyses were conducted, one for each sports activity season using

all subjects who participated during the season, and a second using only those subjects identified as under-achievers. In using this procedure, the effects of interscholastic athletic competition on the scholastic achievement of all participants and underachievers, as a unique group, could be determined for each sports season.

The independent variable used in this study was the relationship between the grades achieved during the fall semester and those achieved during the spring semester. Two elements controlled this variable, the time of the year for the sport, and the separate analyses performed for each sports activity group. The dependent variable was the grade point average for: English, mathematics, science, foreign language, and social studies. In performing this analysis, it is assumed that the grading standards used by the teachers do not vary during the various sports seasons.

The t-test for related samples was the statistic used to determine if there was any significant difference between the grade point averages achieved during the two semesters. In using the t-test for related samples, it was first necessary to determine the mean difference between the fall and spring semesters. This was done with the formula: Mean Difference is equal to the sum of the differences between the fall and spring semesters. Statistically, the formula is written:

$$MD = \sum D/N .$$

The second step in calculating the t statistic required that the standard error of the difference between the means be calculated. The formula is written this way:

$$\sum E_{MD} = \sqrt{\frac{\sum d^2}{N(N-1)}} .$$

Explained verbally, the formula means that the sum of the errors of the mean difference is equal to the square root of the sum of the squares of the difference divided by the number of cases times the quantity of the number of cases minus one. The term, $\sum d^2$ or the sum of the squares of the differences, was determined by using the formula:

$$\sum d^2 = \sum D^2 - (\sum D)^2/N .$$

This formula means that the sum of the squares of the mean differences is equal to the sum of the differences of the semester grade point averages squared minus the quantity of the sum of the differences of the semester grade point averages squared divided by the number of cases. The last step in calculating the t-test for related samples, required that the t be calculated. This was done using the formula:

$$t = MD / \sum E_{MD}$$

This formula means that the relationship between the semester grade point averages, t, is equal to the Mean Difference divided by the sum of the errors of the Mean Difference.

Once the "t" had been calculated, it was compared to

the tabled value at the .05 level of significance. This level was selected as a compromise between the .01 and the .10 levels of significance. The .01 level of significance would have been too stringent for such a small sampling while the .10 would not have been stringent enough. Table XI was the table used for determining the level of significance. The "df" referred to in the table means the degrees of freedom. Degrees of freedom are equal to the number of cases minus one.

TABLE XI
DISTRIBUTION OF t FOR GIVEN PROBABILITY LEVELS^a

df	Level of Significance for One-tailed Test					
	.10	.05	.025	.01	.005	.0005
	Level of Significance for Two-tailed Test					
	.20	.10	.05	.02	.01	.001
1	3.078	6.314	12.706	31.821	63.657	636.619
2	1.886	2.920	4.303	6.965	9.925	31.598
3	1.638	2.353	3.182	4.541	5.841	12.941
4	1.533	2.132	2.776	3.747	4.604	8.610
5	1.476	2.015	2.571	3.365	4.032	6.859
6	1.440	1.943	2.447	3.143	3.707	5.959
7	1.415	1.895	2.365	2.998	3.499	5.405
8	1.397	1.860	2.306	2.896	3.355	5.041
9	1.383	1.833	2.262	2.821	3.250	4.781
10	1.372	1.812	2.228	2.764	3.169	4.587
11	1.363	1.796	2.201	2.718	3.106	4.437
12	1.356	1.782	2.179	2.681	3.055	4.318
13	1.350	1.771	2.160	2.650	3.012	4.221
14	1.345	1.761	2.145	2.624	2.977	4.140
15	1.341	1.753	2.131	2.602	2.947	4.073
16	1.337	1.746	2.120	2.583	2.921	4.015
17	1.333	1.740	2.110	2.567	2.898	3.965
18	1.330	1.734	2.101	2.552	2.878	3.922
19	1.328	1.729	2.093	2.539	2.861	3.883
20	1.325	1.725	2.086	2.528	2.845	3.850
21	1.323	1.721	2.080	2.518	2.831	3.819
22	1.321	1.717	2.074	2.508	2.819	3.792
23	1.319	1.714	2.069	2.500	2.807	3.767
24	1.318	1.711	2.064	2.492	2.797	3.745
25	1.316	1.708	2.060	2.485	2.787	3.725
26	1.315	1.706	2.056	2.479	2.779	3.707
27	1.314	1.703	2.052	2.473	2.771	3.690
28	1.313	1.701	2.048	2.467	2.763	3.674
29	1.311	1.699	2.045	2.462	2.756	3.659
30	1.310	1.697	2.042	2.457	2.750	3.646
40	1.303	1.684	2.021	2.423	2.704	3.551
60	1.296	1.671	2.000	2.390	2.660	3.460
120	1.289	1.658	1.980	2.358	2.617	3.373
∞	1.282	1.645	1.960	2.326	2.576	3.291

^aTable XII is abridged from Table III, Fisher and Yates, Statistical Tables for Biological, Agricultural, and Medical Research (Edinburgh: Oliver and Boyd Ltd.).

CHAPTER IV

FINDINGS

The first null hypothesis (H_1), that there is no significant difference in subject grades, awarded by teachers, when the students participate in interscholastic athletic competition and when they do not participate, was tested using the t-test for related samples. In this way the significant differences between the mean grade point average for spring semester and the mean grade point average for fall semester could be determined. The .05 level for two-tailed test of confidence was used for determining the acceptance or rejection of the null hypothesis.

Table XII reflects the results of the statistical analysis for the total student sample, regardless of whether the student was classified as an individual who achieved at his predicted level or one who underachieved. A separate analysis for each sports activity group provides the substance of the table. A perusal of the table indicates that students who participated in a fall sport only achieved a higher mean grade point average during the fall semester than they did during the spring semester. However, when the t-test was employed to determine if the .08 mean difference was significant, it was found that the difference was not significant and the null hypothesis was retained.

TABLE XII

AN ANALYSIS OF DIFFERENCE IN SEMESTER GRADE MEANS
FOR THE TOTAL STUDENT SAMPLE

Sports Activities*	N	Fall Sem. Average	Spring Sem. Average	Mean Diff.	t-test**
Fall sport only	47	2.131	2.051	.08	1.60
Winter sport only	37	2.064	2.032	.03	.75
Spring sport only	12	1.825	1.533	.29	1.11
Fall & winter sports	22	2.175	2.022	.15	1.87
Fall & spring sports	20	2.780	2.835	-.05	-1.20
Winter & spring sports	4	1.900	1.625	.27	.80
Winter, fall & spring sports	27	2.444	2.366	.08	1.60

*Fall sports: Football or Cross Country.

Winter sports: Basketball or Wrestling.

Spring sport: Track.

**Significant at the .05 level. [There was no significant difference for any of the sports activities.]

In the case of students who had participated only in a winter sport, they too did better during the fall semester than they did in the spring, but, as in the case of the fall sport, the mean difference was not significant and the null hypothesis was retained. Much the same can be said for the students who participated in the spring sport only, and those who participated in both fall and winter sports, in each instance, the students achieved a higher mean grade point average during the fall than that which they achieved during the spring. Still, the mean differences were not significant and the null hypothesis was retained for students who participated in spring sports only and those who participated in both fall and winter sports. Only the students who participated in both a fall and spring sport achieved a higher mean grade point average during the spring semester than they had in the fall semester. The mean difference, a negative .05, was not significant and the null hypothesis was retained in this case too. In regard to those students who participated in winter and spring sports and those students who participated in the last classification, winter, fall and spring, these students did better during the fall than they did during the spring, yet, the differences in these cases too were not significant and the null hypothesis was retained.

The second null hypothesis (H_2), that there is no significant difference in subject grades, awarded by

teachers, to students whose classroom performance is not equal to that predicted by the Differential Aptitude Tests, when these students participate in interscholastic athletic competition and when they do not participate, was, like the first hypothesis, tested using the t-test for related samples. Again, the .05 level for two-tailed test of confidence was used in determining the acceptance or rejection of the null hypothesis.

Table XIII refers only to those students who had been classified as underachievers using the procedures described in Chapter III. The findings which relate to this group of students are only slightly different than those which related to the total student population. The under-achieving students who participated in a fall sport only achieved a significantly higher mean grade point average during the fall semester than they did in the spring. This .14 mean difference was significant at the .05 level and as a result the null hypothesis was rejected. In every other instance, the mean differences were not significant, and the null hypothesis was retained. The findings show that the underachieving students who participated in a winter sport only, achieved higher mean grade point averages during the spring semester than they did during the fall. The negative .04 mean difference was not significant and the null hypothesis was retained. In all other sports activities,

TABLE XIII

AN ANALYSIS OF DIFFERENCE IN SEMESTER GRADE MEANS
FOR STUDENTS CLASSIFIED AS UNDERACHIEVERS

Sports Activities*	N	Fall Sem. Average	Spring Sem. Average	Mean Diff.	t-test**
Fall sport only	30	2.163	2.023	.14	2.33
Winter sport only	23	1.947	1.987	-.04	-.23
Spring sport only	7	1.957	1.623	.33	1.10
Fall & winter sports	13	2.061	1.984	.08	.04
Fall & spring sports	10	2.630	2.620	.01	.33
Winter & spring sports	3	1.600	1.500	.10	1.00
Winter, fall & spring sports	16	2.162	2.062	.10	1.00

*Fall sports: Football or Cross Country.

Winter sports: Basketball or Wrestling.

Spring sport: Track.

**Significant at the .05 level [for fall sport only].

spring sport only, fall and winter sports, fall and spring sports, winter and spring sports, and winter, fall and spring sports, the underachieving participants had higher mean grade point averages in fall than they had in spring, but because the mean differences in each case were not significant, the null hypothesis was retained.

CHAPTER V

SUMMARY AND CONCLUSION

Summary

The purpose of this study was twofold. First, to determine if athletic competition effected the scholastic achievement of high school athletes during the season(s) in which they competed; secondly, to determine if athletic competition effected the scholastic achievement of high school athletes, identified as underachievers, during the season(s) in which they competed. Underachievers were identified by using tenth year grades in conjunction with Differential Aptitude Tests results. Achievement was measured by teacher awarded classroom grades for each semester. Athletic activities were grouped according to the seasons in which they were sponsored. Fall semester activities, if they effect semester grades, would effect grades earned during the fall semester. In the same way winter season activities would effect both the fall and spring semester grades since these activities are sponsored during both semesters. Spring season activities, it was reasoned, would only effect spring semester grades since such activities are sponsored only during the spring semester.

The initial data for this study was obtained from the school records of the six high schools which comprise the

Central Kansas League. This league was chosen since it was assumed that a sufficient number of students, meeting the criteria established for the student sample, could be found in the student population of the league. It was also assumed, that the differences in this population was evenly distributed throughout the league.

The criteria used in selecting the student sampling was that the sample students be eleventh graders and that they had competed in at least one complete season.

The t-test for related samples was used to determine if there was any significant difference between spring semester and fall semester grades achieved by the total student sample, and also for the underachiever as a unique part of the sample. Through the use of this analysis technique, it was determined if the independent variable, the time of year for the sport, did in fact have any effect upon the scholastic achievement of students.

Conclusion

The t-test revealed that for the first null hypothesis (H_1)--it is predicted that there is no significant difference in subject grades, awarded by teachers, when the students participate in interscholastic athletic competition and when they do not participate--was retained, for all sports activity groups.

The t-test revealed that for the second null hypothesis (H_2)--it is predicted that there is no significant difference in subject grades, awarded by teachers, to students whose classroom performances are not equal to that predicted by the Differential Aptitude Tests, when these students participate in interscholastic athletic competition and when they do not participate--was retained for all groups, with the single exception of fall sport only. For this group the t-test revealed that the null hypothesis was rejected and that students competing in a fall sport only did significantly better during the fall semester than they did during the spring semester. When the groups were not considered individually, and the difference in the means for all underachievers was computed, the null hypothesis for the group as a whole was retained.

Implications

The retention of both hypotheses reveals that there is no significant difference in the mean grade point averages achieved by students, underachievers or not, when they compete in athletic competition and when they do not compete. This finding is of value to school administrators, directors of curriculum, classroom teachers, and the lay public since they all share some responsibility for the school program. The purpose of any school program should

be to provide the student with learning experiences from which he can profit. The findings of this study imply the justification of a high school interscholastic athletic program. It is obvious that the student who participates in athletic competition must put forth effort and time if he is to succeed as an athlete. Yet the findings show that this expenditure of time and effort does not affect his scholastic achievement over the course of an academic year. It can be assumed that the student who expends the necessary energy to be both an athlete and a scholar finds the athletic program to be of value. What better justification can persons concerned with the school have for supporting the interscholastic athletic program? One further comment in regard to the implications of this research, if the persons who are responsible for school programs are convinced that interscholastic athletic programs are of value, then these programs should be supported through the regular school budget.

Suggestions for Further Research

The writer believes that further research is needed. Below are some suggestions for further research and study.

1. Develop a similar study using a larger population and a longer period of time.
2. Develop a study to determine the effects of interscholastic competition on those persons who

participate in some manner other than by competing. For example, what affect does participation have on the scholastic achievement of cheerleaders, team managers and participants in Intramural Athletics.

3. Develop a study which would begin to determine why athletes compete. What benefits do they derive as a result of their extra efforts?

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AN ANALYSIS OF THE EFFECTS OF INTERSCHOLASTIC ATHLETIC
COMPETITION ON SCHOLASTIC ACHIEVEMENT

by

MARTIN MARC LEFTOFF
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Although interscholastic athletic competition is sponsored in most American high schools, little is known about its effects on the scholastic achievement of participating high school athletes. It was the purpose of this study to determine the effects interscholastic, athletic competition on the scholastic achievement of high school athletes as a whole, and to study the effects of such competition on the scholastic achievement of those athletes who can be identified as underachieving students. Specifically, the primary consideration of this study was to test the following hypothesis:

- H₁: There is no significant difference in subject grades, awarded by teachers, when the students participate in interscholastic athletic competition and when they do not participate.
- H₂: There is no significant difference in subject grades, awarded by teachers to students whose classroom performance is not equal to that predicted by the Differential Aptitude Tests, when these students participate in interscholastic athletic competition and when they do not participate.

The measure of scholastic achievement was teacher awarded eleventh year subject grades for: English, mathematics, science, foreign language, and social studies. Tenth year grade point averages in conjunction with scores from the Differential Aptitude Tests were used in identifying underachievers.

The student sample was drawn from the six schools which comprise the Central Kansas League. All students in

the sample were eleventh graders during the academic year, 1967-68. Once the data concerning the Differential Aptitude Tests scores, and tenth and eleventh year grades were compiled, the students were grouped according to the athletic activities in which they participated. The seven resulting groups consisted of students who had participated in: (1) a fall sport only, (2) a winter sport only, (3) a spring sport only, (4) fall and winter sports, (5) fall and spring sports, (6) winter and spring sports, and (7) fall, winter, and spring sports. Football and cross country were identified as fall sports, while basketball and wrestling were considered winter sports, and track was the only spring sport. The total number of students in the sample was 169. Of these, 102 or 60 per cent were identified as underachievers.

The t-test for related samples was the statistic used to determine if there were any significant difference between the two semesters for eleventh year. It was concluded that there was no significant difference between the grade point averages of students, underachievers or not, when they competed in interscholastic athletic activities and when they did not compete.

Because this study was limited in both time and number of students, it was recommended that a similar study using a larger population and a longer period of time be developed. It was also suggested that because

interscholastic athletic activities may effect the scholastic achievement of noncompeting students, such as cheerleaders and team managers, that a similar study be conducted using these students. Finally, because interscholastic athletic activities are a part of the school program in which students participate voluntarily, it was recommended that a study be developed to determine the benefits attributed to interscholastic athletic activities by students.